No other sites with smooth newt records are known within 3km of the town's boundary and no verifiable or precise records can be found for this region. Each pond is located close to a site at which development has recently taken place (GSO Business Park and K-Park Training Academy, Calderglen). K-Park Training Academy received some negative attention from the local newspaper during construction when old beech trees were removed to make way for football pitches. It is common knowledge within the town that K-Park was not universally well received with letters of complaint being issued by individuals who use Calderglen Country Park in which K-Park was built for dog walking and other outdoor pursuits. On this account, I tentatively speculate that there is a small possibility that smooth newts have been introduced at these sites by local individuals who, having seen the orange bellies of the males coupled with a crest, assumed that they were handling protected great crested newts (*Triturus cristatus*) and introduced them at these sites. This is a tentative and highly speculative proposal and further, more comprehensive survey effort is required in the local area to determine the true extent of the spread of the smooth newt before any further conclusions can be made.

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Fig. 2. GSO Business Park SUDS, East Kilbride.

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Ecological distribution of the water grimmia (*Schistidium agassizii* Sull. & Lesq.), a nationally scarce semi-aquatic moss in the U.K., with a new record from an upland tributary of the River Dee, N.E. Scotland

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Bryophytes comprise a highly successful group of plants that have managed to exploit environmental conditions generally unsuitable for sustaining vascular plant growth (Stream Bryophyte Group, 1999; Lang, 2010). For example, in fast flowing and boulder-strewn upland headwater streams, bryophytes are often the dominant form of plant life, tolerating being pummeled by harsh current velocities and dislodged or rolling substratum (Lang, 2010; Lang & Murphy, 2012). These stream bryophytes encompass a relatively small proportion of the moss and liverwort flora capable of occupying habitats frequently inundated with water (Stream Bryophyte Group, 1999). Recent work has placed emphasis on the potential value of bryophyte communities for making integrated bioassessments of water quality, and through their prevailing life strategies, also reveal important information concerning the physical character of rivers (Lang & Murphy, 2012; Vieira *et al.*, 2012).

The water grimmia, *Schistidium agassizii* Sull. & Lesq. [= *Grimmia agassizii* (Sull. & Lesq.) Jaeg.] is a

semi-aquatic moss species belonging to the family Grimmiaceae, characterised by predominantly dark green-brown to blackish foliage (Birks & Birks, 1967; Smith, 2004). Tending to form discrete clumps, the moss can be found pressed against the surfaces and crevices of partially submersed rocks in rivers (Holmes, 1976; Lang, 2010), though little is understood about its habitat ecology (http://www.bbsfieldguide.org.uk/sites/default/files/pdfs/mosses/Schistidium_agassizii.pdf).

Schistidium agassizii is designated as nationally scarce (Averis *et al.*, 2012), occurring in only thirteen myriads (U.K. Ordnance Survey grid unit areas of 100 x 100 km², designated by a two letter code) across Great Britain (https://data.nbn.org.uk/Taxa/NHMSYS0000310590). In Scotland, it is considered a species of principal importance for biodiversity conservation (http://www.scotland.gov.uk/Topics/Environment/Wildlife-Habitats/16118/Biodiversitylist/SBL).

A northerly distribution of *S. agassizii* is somewhat apparent (Hill *et al.*, 1992; Fig. 1), with the majority of the U.K. records derived from Scottish sites (Table 1), mostly located in the Highlands.

Fig. 1. Grid map of distribution records of the water grimmia, *Schistidium agassizii* in the U.K. (reproduced with permission from https://data.nbn.org.uk/Taxa/NHMSYS0000310590/Grid Map). © Crown copyright and database rights 2011 Ordnance Survey [100017955].

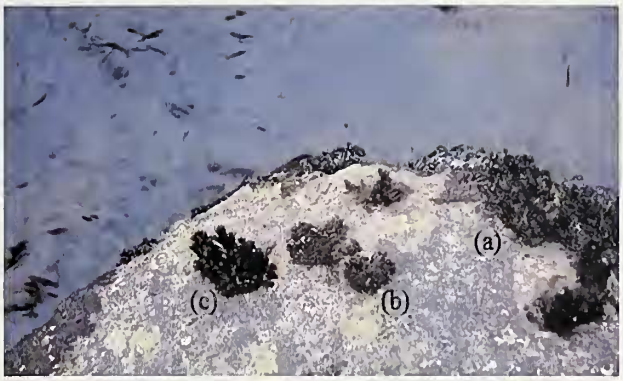

Fig. 2. Photograph of *Schistidium agassizii* (a) co-occurring with *Blindia acuta* (b) and *Racomitrium aciculare* (c) on a partially submersed rock in the Girnock Burn, Royal Deeside.

Table 1. Verified U.K. records of *Schistidium agassizii* (https://data.nbn.org.uk/Taxa/NHMSYS0000310590); OS myriad pre-fixed with superscript letter 'S', 'E' or 'W' denoting whether moss populations were derived from Scotland, England or Wales, respectively.

U.K. NGR myriad (100 x 100 km² resolution)	Number of U.K. hectads containing records of *S. agassizii* (10 x 10 km² resolution)	Number of individual U.K. records of *S. agassizii* per myriad held by NBN database, to January 2014
^{S}NN	8	23
^{S}NH	6	14
^{S}NC	5	21
^{S}NO	5	10
^{S}NJ	2	6
^{S}ND	1	2
^{S}NG	1	2
^{S}NR	1	2
^{S}NS	1	3
^{S}NX	1	1
^{E}NY	3	28
^{E}SD	1	1
^{W}SH	3	7
Total	**38**	**120**

Of the 120 verified records of *Schistidium agassizii* held by the NBN database, to January 2014 for the U.K. (https://data.nbn.org.uk/Taxa/NHMSYS0000310590), nearly all are from riverine locations (with the species hitherto being recorded from 24 Scottish rivers and streams, together with two lochside

locations, as well as records from Ben Lawers (e.g., Birks & Birks, 1967), and Polgown Craigs on the north bank of the Scaur Water, in the upper catchment of the R. Nith). Within the R. Dee catchment in Aberdeenshire, there are two existing records from a single site on the river, approximately 2.5 km downstream of Ballater. During botanical surveys conducted in 2005 and 2006, undertaken as part of a larger research project (Lang, 2010), we additionally observed this moss species on repeated occasions, usually limited to sizeable substratum within the stream channel at Hampshires' Bridge (NO 312 912), on the Girnock Burn, a small tributary of the River Dee (joining the river about 5 km upstream of Ballater). The underlying catchment geology of the Girnock Burn is chiefly granitic, interspersed with base-rich rocks that includes a small proportion of limestone (Soulsby *et al.*, 2007; Tetzlaff *et al.*, 2007; Lang & Murphy, 2012), producing a streambed morphology characterised by a high abundance of cobbles and the presence of some larger boulders (Lang, 2010). Its water physico-chemistry is principally oligotrophic (phosphate concentration usually < 0.003 mg L^{-1}), circumneutral (mean pH 7.10) and reasonably well-buffered (mean alkalinity 23.08 mg L^{-1} as $CaCO_3$) against acid-induced spate events (Lang, 2010). We found that *Schistidium agassizii* typically co-occurred with *Blindia acuta* (Hedw.) Bruch & Schimp. and *Racomitrium aciculare* (Hedw.) Brid. (Fig. 2), together forming a small biomass, low diversity species assemblage displaying stress/disturbance resistant traits (e.g., small leaves, wiry stems, streamlined morphology), indicative of intensely scoured and unstable habitat conditions (Lang & Murphy, 2012). This association has been noted to occur elsewhere in Scotland (e.g., the Bruar Water: http://www.sepa.org.uk/water/water_regulation/advertised_applications/idoc.ashx?docid=51ea134b-77c7-4b14-8e16-432c997a4e53&version=-1), and northern England (e.g., upper stretches of the River Tees: Holmes, 1976). Furthermore, the inferences drawn by Lang & Murphy (2012) regarding the adaptiveness of turf mosses such as *Schistidium agassizii*, *Blindia acuta* and *Racomitrium aciculare* for enduring frequently disturbed conditions in high latitude upland streams, generally agree with wider research findings (e.g., Muotka & Virtanen, 1995; Virtanen *et al.*, 2001).

We report a newly confirmed record of the nationally scarce water grimmia, *Schistidium agassizii*, the ecological distribution of which fits in with previous occurrences documented by the NBN Gateway. Although the moss may be genuinely rare, perhaps it is simply under-recorded or mistaken for *Schistidium rivulare* (Brid.) Podp., which is similar. Therefore, further work on the habitat ecology of *S. agassizii* would certainly benefit conservation knowledge concerning this particular species.

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ELECTRONIC RESOURCES

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http://www.scotland.gov.uk/Topics/Environment/Wildlife-Habitats/16118/Biodiversitylist/SBL

https://data.nbn.org.uk/Taxa/NHMSYS0000310590

https://data.nbn.org.uk/Taxa/NHMSYS0000310590/Grid Map

http://www.sepa.org.uk/water/water_regulation/advertised_applications/idoc.ashx?docid=51ea134b-77c7-4b14-8e16-432c997a4e53&version=-1

Some uncommon desmids (Chlorophyta, Zygnemophyceae) encountered in the phytoplankton of Scottish lochs

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Desmids are an idiosyncratic group of green algae (Chlorophyta, Zygnemophyceae) comprising two highly symmetrical halves or 'semi-cells', leading either a solitary or colonial existence (Coesel & Krienitz, 2008). They are usually found dwelling amongst the algal communities of standing freshwater habitats, widely ranging from upland bogs to lowland lakes (John & Williamson, 2009). Although some genera are often perceived as taxonomically 'easier' (e.g., *Micrasterias*) because they are intrinsically better defined than others (e.g., *Staurastrum*), the intricate semi-cell architecture and morphological continua displayed by desmids can make accurate species-level identification notoriously challenging (Brook & Williamson, 2010). For this reason, and coinciding with the limited accounts in at-hand published floras (themselves based on reliable records), there may be an inclination towards subjectively lumping desmid specimens under the appropriate genera or species of similar appearance. However, adopting this 'broad brush' approach is likely to have implications for establishing precise estimates of algal biodiversity and also, up to a point, water quality assessments, potentially masking the vulnerability of freshwater ecosystems to environmental threats such as eutrophication and climate change at the microscale.

In the course of analysing phytoplankton samples collected as part of the Scottish Environment Protection Agency's ongoing assessment of the ecological status of freshwater lochs in Scotland (see Lang *et al.*, 2013), a number of relatively uncommon desmids were discovered during the 2009 to 2010 monitoring period. In particular, six species (Table 1; Fig. 1*a* - *f*) did not match any desmids described by Brook (2002) for the British Isles. These did, however, more closely resemble taxa recorded from western Ireland as illustrated by John & Williamson (2009), suggesting an eco-geographical overlap of desmid assemblages between this region and north-west Scotland (from where most of the uncommon desmids presented here were derived). Three of the six species have since been included in the second edition of *The Freshwater Algal Flora of the British Isles* (Brook *et al.*, 2011), whilst the other desmids remain to be fully depicted (Table 1).

It seems that some of the less common desmids, defined by Brook *et al.* (2011) as those typically observed on fewer than five sampling occasions, may have been overlooked. Why? Firstly, it is a painstaking task documenting all of the *c.* 800 desmid species currently known to occur in Britain and Ireland, though this apparently overwhelming feat has been accomplished elsewhere (e.g., Brook & Williamson, 2010; John *et al.*, 2011). Nevertheless, a published flora is not necessarily a definitive list. Extensive surveillance monitoring, akin to that of